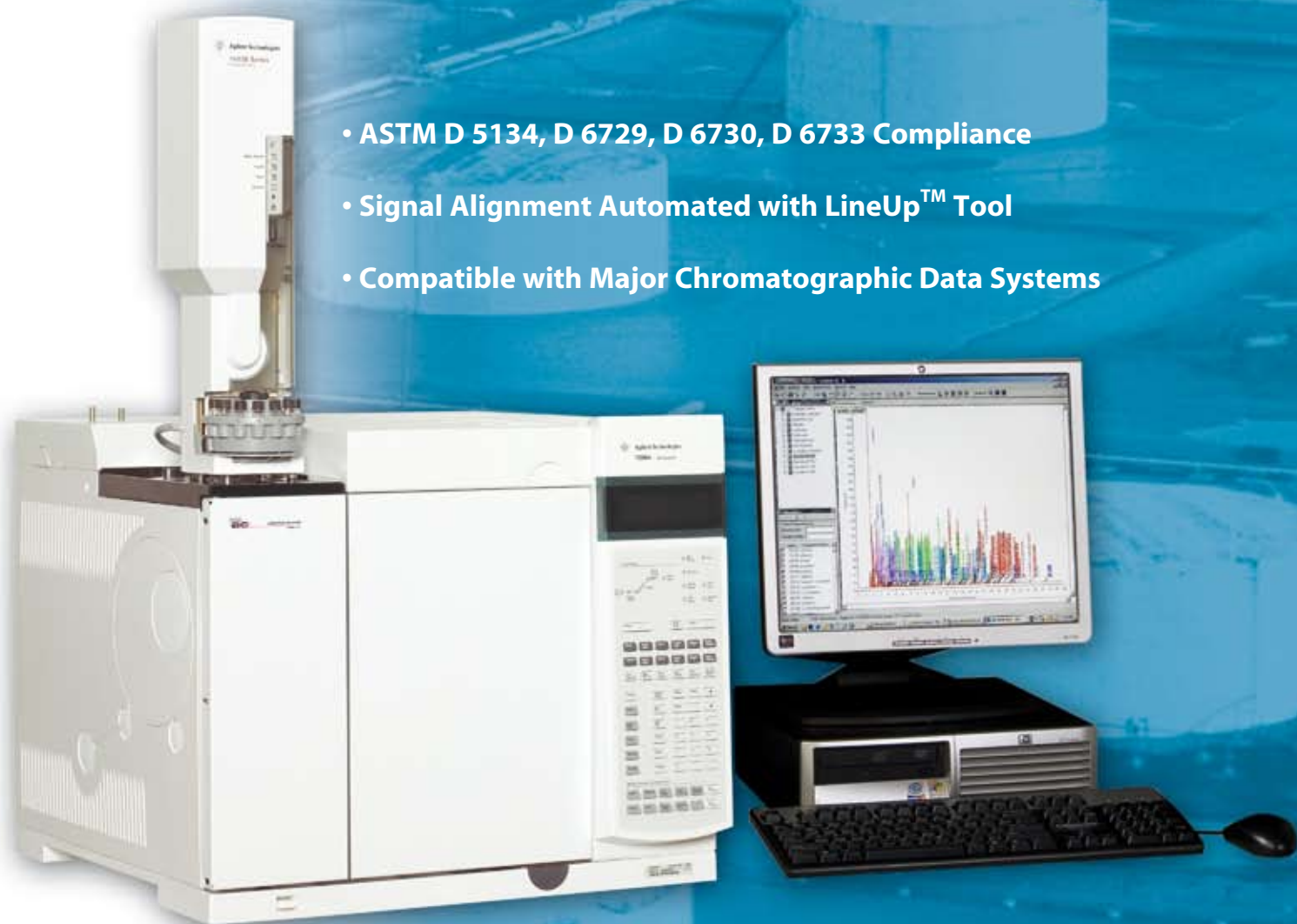


AC DHA Solutions

Detailed Hydrocarbon Analysis of Light Petroleum Streams & Light End in Crude Oils

- ASTM D 5134, D 6729, D 6730, D 6733 Compliance
- Signal Alignment Automated with LineUp™ Tool
- Compatible with Major Chromatographic Data Systems



ANALYTICAL CONTROLS

A  PAC Company

Detailed Hydrocarbon Analysis

Detailed hydrocarbon analysis uses single column technology to determine the components in petroleum streams. AC Analytical Controls® offers a full range of Detailed Hydrocarbon Analyzers (DHA) for flexible and reliable component identification. The unique DHA Combi system design accommodates the analysis of both light petroleum streams and the light end in crude oil.

- Full range of DHA applications comply with ASTM D 5134, D 6729, D 6730 & D 6733
- LineUp™ tool automates signal alignment to improve peak identification
- DHA Front End application uses the AC pre-fractionator for the analysis of the light end in crude oil conform IP PM-DL
- Unique Combi system permits the analysis of both light petroleum streams and the light end in crude oil
- Available on the new Agilent Technologies 7890 GC and the compact 6850 GC
- Innovative option merges DHA FE analysis data with High Temp SIMDIS results to improve accuracy of crude oil analysis
- Predefined settings per sample type contribute to reliable peak identification
- Special toolbar button automatically starts the LIMS interface
- Each system is factory-tuned for the methods specified
- A global network of AC certified support engineers installs the system on-site

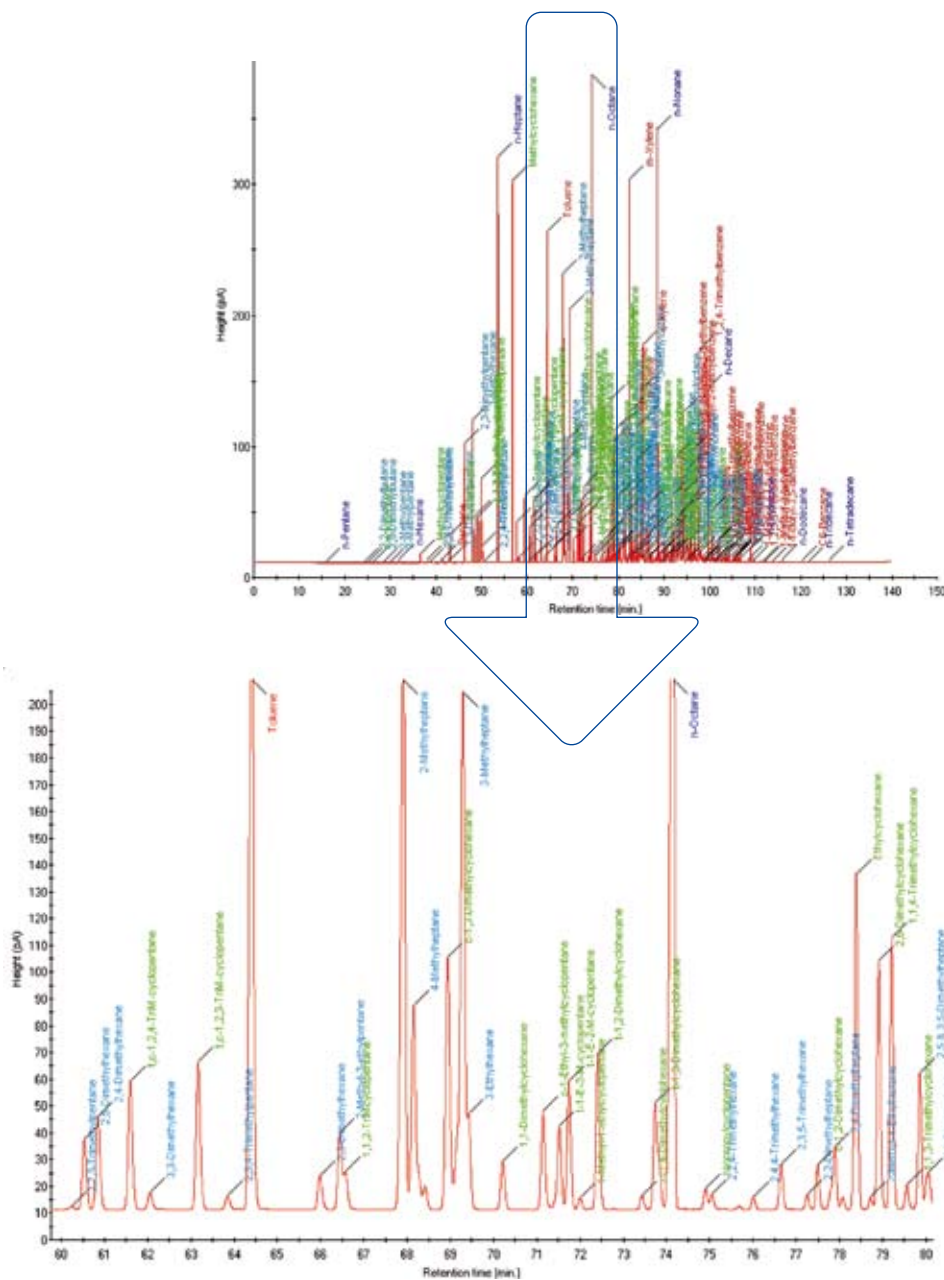


Full Range of Applications

The AC DHA applications are dedicated to characterizing the composition of petroleum streams and comply with ASTM methods D 5134, D 6729, D 6730 and D 6733. The AC product range also includes a fast DHA application to determine the individual components in gasoline blending feedstocks within 28 minutes.

Accurate Crude Oil Analysis

The DHA Front End (FE) application complies with IP PM-DL to characterize the C1 - nC9 fraction in crude oil. AC pioneered an innovative software option to merge the DHA FE analysis data with High Temperature SIMDIS results. Merging the DHA FE - SIMDIS analysis data improves the accuracy of a crude oil analysis. The merging principle is standardized in IP 545, prEN 15199-3 and ASTM D 7169.



AC DHA D 6729 analysis of reformer feed

Unique Combi Design



The AC DHA Combi design allows analysts to combine two DHA applications into one Agilent 7890 GC. Using the unique AC Combi inlet, the DHA Combi analyzer includes both the DHA Front End application for light end analysis in crude oil and one of the following standard ASTM test methods: D 6729, D 6730, D 6733 or the AC Fast DHA application.

Basic Configuration

The AC DHA systems use an Agilent Technologies gas chromatograph equipped with:

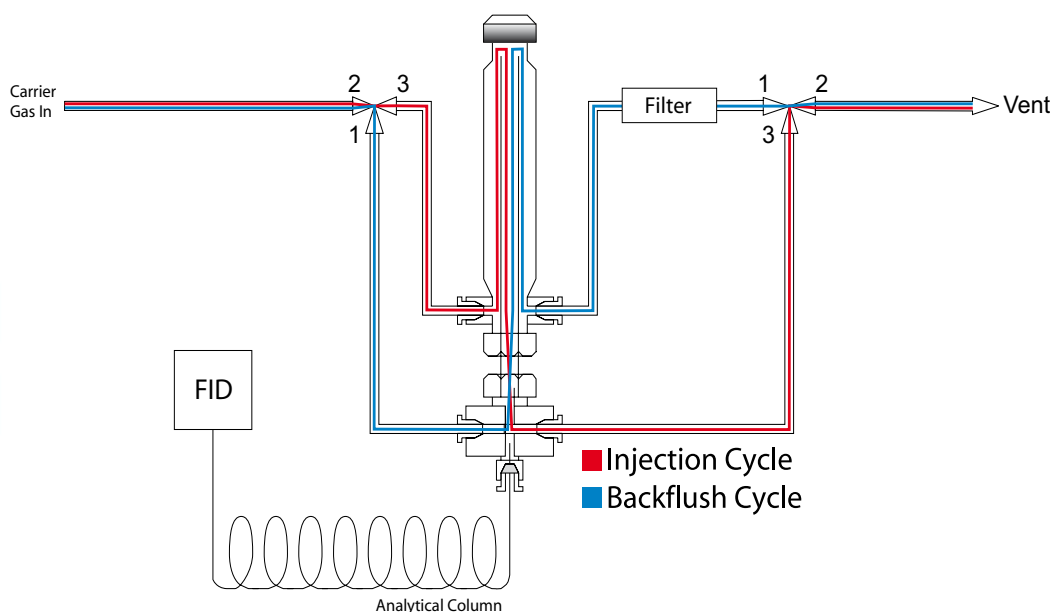
- A di-methyl silicone capillary column
- A split/splitless (S/SL) injector
- A flame ionization detector
- An automatic liquid sampler

Select either the easy-to-use, more compact 6850 GC or the new 7890 GC.



Combi Configuration

The AC DHA Front End and Combi solutions are available on the Agilent 7890 Series GC only. For the Front End application the AC pre-fractionator is added to the basic configuration to backflush the heavy end. The AC Combi systems use a special inlet design: a pre-fractionating injector coupled to a split/splitless injector. The S/SL injector is dedicated to the detailed hydrocarbon analysis of samples in the naphtha and gasoline range. Crude oil samples are injected on the pre-fractionating injector.

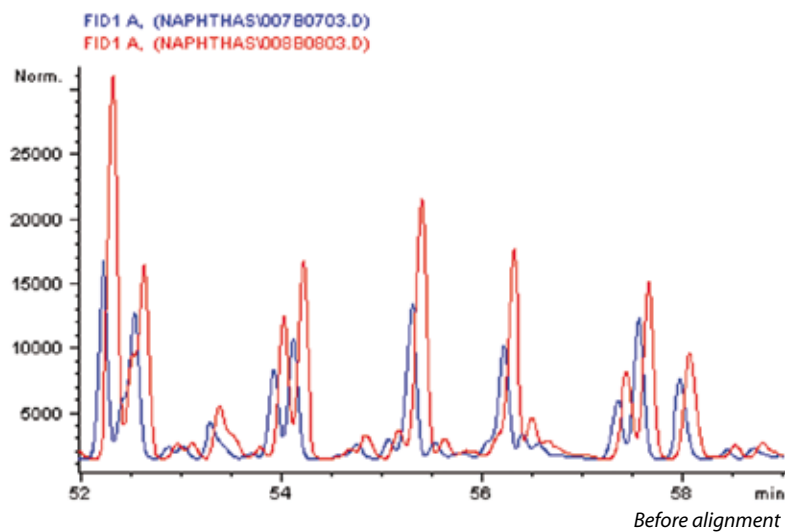


AC DHA pre - fractionator

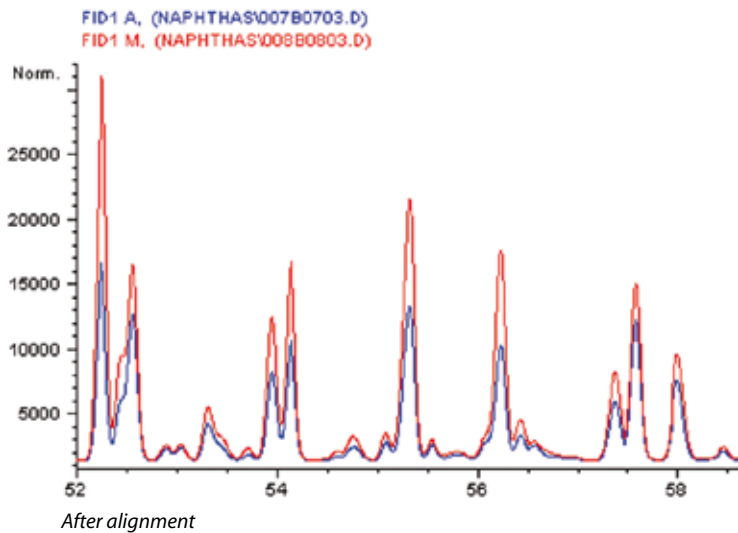
Automated Signal Alignment

The AC DHA Plus software incorporates LineUp™ software that eliminates run-to-run variability and minimizes the need for manual intervention.

LineUp software provides analysts with a fully automated tool to stabilize retention times. The tool aligns the retention axis to a target chromatogram and corrects for any variation in column aging and/or flow. The LineUp tool processes each sample automatically and is completely integrated into the DHA method.



Before alignment



After alignment

LineUP Parameters

Alignment Options

Slack Parameter 2

Segment Size 100

Alignment Targets

C:\HPCHEM\2\DATA\SS\TDEMO\VALKYLATE.D\FID1A.
C:\HPCHEM\2\DATA\SS\TDEMO\GASOLI-2.D\FID1A.
C:\HPCHEM\2\DATA\SS\TDEMO\CALIBR-2.D\FID1A.

Add Target Remove Targets

Align Signal suffix = M

OK Cancel Defaults

"Setting alignment of the sample to the target chromatogram, corrects for any variation in column aging and flow."

Compatible with Major Chromatographic Data Systems

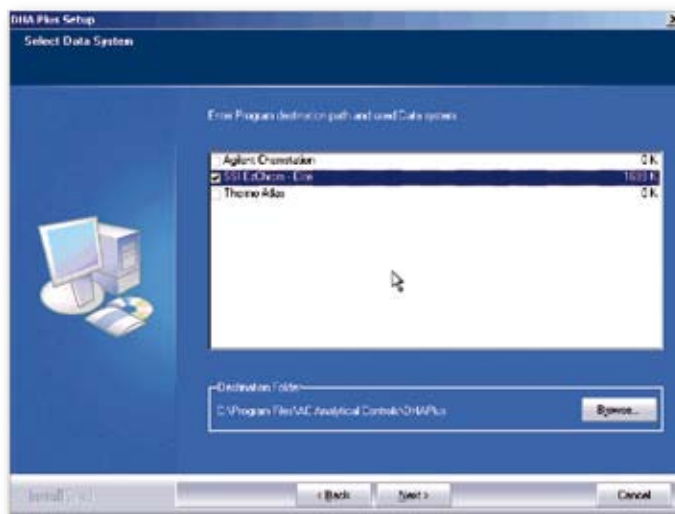
Flexible Data Systems

The DHA applications will offer you flexibility in selecting a gas chromatographic data system.

The DHA Plus software operates on various chromatographic data systems:

- ChemStation - Agilent Technologies
- EZChrom Elite - Agilent Technologies*
- Atlas - Thermo Electron*

* LineUp tool not included



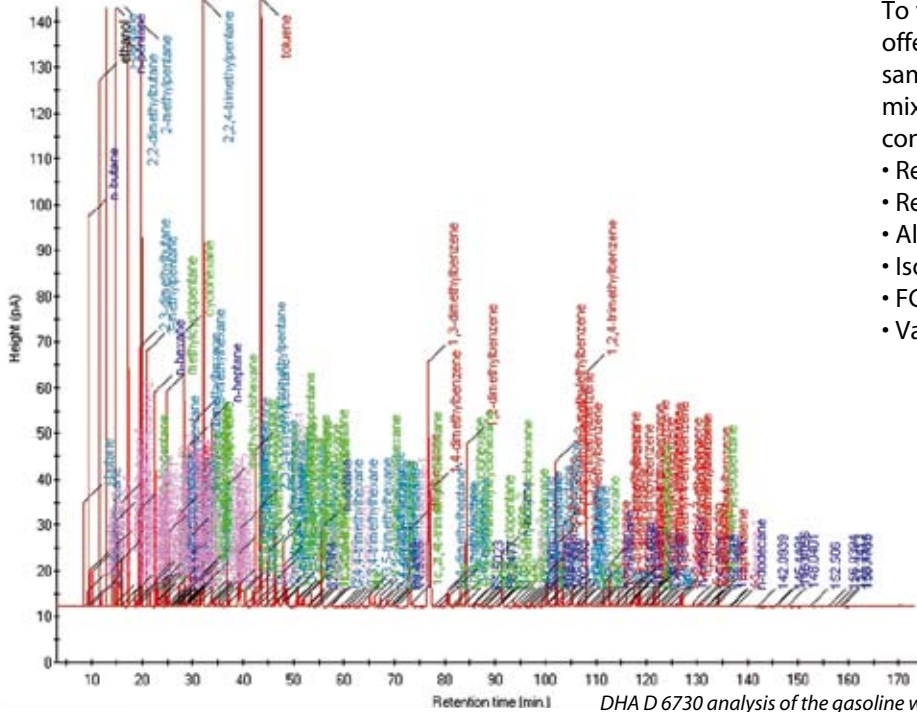
Predefined Applications

The DHA Plus software predefines the properties of the DHA application per sample type, and includes definitions for retention index, molecular weight and response factor. Pre-programmed settings contribute to analysis reliability.

This menu predefines properties of the DHA application per sample type.

No	Component name	Type	Index	Response	BP°C	Density	Octane
1	methane	n-Paraffin	100.0	1.1210	-161.5	0.2600	122
2	ethylene	Olefin	179.1	1.0500	-103.7	0.3000	122
3	ethane	n-Paraffin	200.0	1.0510	-88.6	0.3099	122
4	propylene	Olefin	294.0	1.0300	-47.7	0.5053	122
5	propane	n-Paraffin	300.0	1.0270	-42.0	0.5005	122
6	n-butane	iso-Paraffin	361.6	1.0150	-11.7	0.5572	122
7	methanol	Oxygenates	378.8	3.1490	65.0	0.7914	100
8	butene-1	Olefin	390.7	0.9800	-6.3	0.5951	122
9	isobutylene	Olefin	391.5	0.9800	-6.3	0.5951	122
10	1,3-butadiene	Olefin	394.9	0.9800	-4.4	0.6211	122
11	n-butane	n-Paraffin	400.0	1.0150	-0.5	0.5788	113
12	vinyl acetylene	Olefin	409.0	1.1000	0.0	0.6500	100
13	isobutene-2	Olefin	409.0	0.9800	0.9	0.6042	100
14	2,2-dimethylpropane	iso-Paraffin	413.0	1.0080	9.5	0.5910	100
15	n-pentane-2	Olefin	477.0	0.9800	1.7	0.6713	100

System Validation



To verify the DHA application, AC offers various quality control (QC) samples, including an n-alkane mixture. The QC sample range consists of:

- Reformer feed
- Reformate
- Alkylate
- Isomerate
- FCC naphtha
- Various gasolines

DHA D 6730 analysis of the gasoline with ethanol QC sample

Report Options

- Chromatogram with colored peak identification
- Component concentrations table
- True boiling point distribution report
- Carbon number versus group type table
- RON specification
- Specific gravity and molecular weight report
- Export of report to either CSV or PDF file
- Special toolbar button automatically starts the LIMS interface

Examples of the report options for the DHA D 6730 analysis of gasoline

Composite report
Total by group type & carbon number
(in mass percent)

n-Paraffins	Isoparaffins	Olefins	Naphthenes
-	-	-	-
1.282	0.299	0.251	-
2.917	7.230	1.676	0.472
Molecular weight and specific gravity			
Ave. Mw	Specific gravity		
46.07	0.7890		

Research octane number = 96.685
Calculated from the individual component contributions

Contributions subdivided into:

n-Paraffins	4.939
iso-Paraffins	35.808
Olefins	5.550
Naphthenes	7.652
Aromatics	29.568
Oxygenates	4.668
Offset for sample type	8.500

Features & Benefits of AC DHA Analyzers

AC Analytical Controls BV

P.O. Box 10054, 3004 AB Rotterdam
Innsbruckweg 35, 3047 AG Rotterdam
the Netherlands
Phone : +31-10-462 4811
Fax : +31-10-462 6330
E-mail : acbv@analytical-controls.com

AC Analytical Controls Asia Pacific Ltd

30 Robinson Road
Robinson Towers #03-04
048546 Singapore
Phone : +65-6324-9016
Fax : +65-6324-9019
E-mail : ac-asia@analytical-controls.com

AC Analytical Controls Service

Administration - PAC LP

8824 Fallbrook Dr.
Houston, TX 77064, U.S.A.
Phone : 1 281 580 0339
Fax : 1 281 580 0719
E-mail : acinc@analytical-controls.com

AC Analytical Controls North Asia

World Vision Building #621
24-2 Youido-dong, Youngdeungpo-ku
150-010 Seoul, Korea
Phone : +82-2-785 3900
Fax : +82-2-785 3977
E-mail : ac-korea@analytical-controls.com

AC Analytical Controls B.V. Beijing Representative Office

Room 1816, CNT Manhattan Building No.6
Chaoyangmen Beidajie, Dongcheng Dist.,
Beijing, P.R.China 100027
Phone : +86-10-8528 2295
Fax : +86-10-8528 2299
E-mail : ac-china@analytical-controls.com

AC Analytical Controls Thailand

25 Floor, M. Thai Tower, All seasons place
87 Wireless Road, Lumpini, Phatumwan
Bangkok 10330 Thailand
Phone : +66-2-627 9410
Fax : +66-2-627 9401
E-mail : ac-thailand@analytical-controls.com

For more information:

www.analytical-controls.com

www.dha-analysis.com

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- Special toolbar button automatically starts the LIMS interface
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- A global network of AC certified support engineers installs the system on-site
- One year hardware and application warranty includes free helpdesk
- Optional on-line remote support by LAN connection is available

